APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,659	12/18/2001	Kameran Azadet	14-6	1760

7590 02/10/2006		EXAMINER

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ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/022,659	AZADET ET AL.
	Examiner	Art Unit	
	Juan A. Torres	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>06 June 2005</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-22</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-22</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1, 8 and 16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

Claim 5 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It is inherently to the MTL-3 code that MLT-3 code uses three signal levels to represent two binary values.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 16-19 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Raghavan (US 6418172 B1).

As per claim 16, Raghavan discloses a method for representing an MLT-3 code as a trellis, the MLT-3 code uses three signal levels to represent two binary values

(figure 1A column 3 lines 37-50), the method comprising generating the trellis with a plurality of trellis states, each of the trellis states associated with a value for a signal in a previous symbol period (figure 1A column 3 lines 37-50); and generating each of the trellis states with at least two branches leaving or entering each state, each of the at least two branches corresponding to state transitions associated with the two binary values (figure 1A column 3 lines 37-50).

As per claim 17, Raghavan discloses claim 16. Raghavan also discloses that a first one of said plurality of trellis states corresponds to a value for a signal in a previous symbol period of +1 (figure 1A column 3 lines 37-50).

As per claim 18, Raghavan discloses claim 16. Raghavan also discloses that a second and third of said plurality of trellis states corresponds to a value for a signal in a previous symbol period of 0 (figure 1A column 3 lines 37-50).

As per claim 19, Raghavan discloses claim 16. Raghavan also discloses that a fourth one of said plurality of trellis states corresponds to a value for a signal in a previous symbol period of -1 (figure 1A column 3 lines 37-50).

As per claim 22 Raghavan disclose claim 16. Raghavan also discloses an Ethernet channel (column 1 lines 11-34).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9, 11-15, 20 and 21 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Raghavan (US 6418172 B1) in view of Heegard (US 6961392 B2).

As per claims 1 and 8 Raghavan discloses generating at least one trellis

representing a MLT-3 code and a dispersive channel. Raghavan doesn't specifically

disclose performing joint equalization and decoding of the received signal using a trellis.

Heegard discloses performing joint equalization and decoding of the received signal

using a trellis to mitigate ISI (abstract; figures 4 and 5 column 8 line 1 to column 9 line

28). The cable channel disclosed by Raghavan is an Ethernet channel (column 1 lines

11-34) that is a dispersive channel that produces ISI. Raghavan and Heegard teachings

are analogous art because they are from the same field of endeavor. At the time of the

invention it would have been obvious to a person of ordinary skill in the art to integrate

the joint equalization and decoding technique disclosed by Heegard with the MLT-3

code and a dispersive channel scheme disclosed by Raghavan. The

suggestion/motivation for doing so would have been to reduce the intersymbol

interference (ISI) improving the BER of the system (Heegard abstract). Therefore, it

would have been obvious to combine Raghavan with Heegard to obtain the invention as

specified in claims 1 and 8.

As per claims 2 and 9 Raghavan and Heegard disclose claims 1 and 8. Heegard

also discloses using a reduced complexity sequence estimation technique (column 4

lines 8-67). Raghavan and Heegard teachings are analogous art because they are from

the same field of endeavor. At the time of the invention it would have been obvious to a

person of ordinary skill in the art to integrate the joint equalization and decoding

technique disclosed by Heegard with the MLT-3 code and a dispersive channel scheme

disclosed by Raghavan. The suggestion/motivation for doing so would have been to

reduce the intersymbol interference (ISI) improving the BER of the system (Heegard

abstract). Therefore, it would have been obvious to combine Raghavan with Heegard to

obtain the invention as specified in claims 2 and 9.

As per claims 3 and 11 Raghavan and Heegard disclose claims 1 and 8.

Heegard also discloses the use the Viterbi algorithm (column 2 line 59 to column 3 line

53). Raghavan and Heegard teachings are analogous art because they are from the

same field of endeavor. At the time of the invention it would have been obvious to a

person of ordinary skill in the art to integrate the joint equalization and decoding

technique disclosed by Heegard with the MLT-3 code and a dispersive channel scheme

disclosed by Raghavan. The suggestion/motivation for doing so would have been to

reduce the intersymbol interference (ISI) improving the BER of the system (Heegard

abstract). Therefore, it would have been obvious to combine Raghavan with Heegard to

obtain the invention as specified in claims 3 and 11.

As per claims 4 and 13, Raghavan and Heegard disclose claims 1 and 8.

Heegard also discloses a concatenation of a trellis representing the encoded code and

a trellis representing said dispersive channel (figure 1, column 1 lines 56 to column 2

line 5; column 6 line 41 to column 7 line 7). Raghavan and Heegard teachings are

analogous art because they are from the same field of endeavor. At the time of the

invention it would have been obvious to a person of ordinary skill in the art to integrate

the joint equalization and decoding technique disclosed by Heegard with the MLT-3

code and a dispersive channel scheme disclosed by Raghavan. The suggestion/motivation for doing so would have been to reduce the intersymbol interference (ISI) improving the BER of the system (Heegard abstract). Therefore, it would have been obvious to combine Raghavan with Heegard to obtain the invention as specified in claims 4 and 13.

As per claim 5 Raghavan and Heegard disclose claim 1. Raghavan also discloses that the MLT-3 code uses three signal levels to represent two binary values (column 1 lines 24-36). Raghavan and Heegard teachings are analogous art because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to integrate the joint equalization and decoding technique disclosed by Heegard with the MLT-3 code and a dispersive channel scheme disclosed by Raghavan. The suggestion/motivation for doing so would have been to reduce the intersymbol interference (ISI) improving the BER of the system (Heegard abstract). Therefore, it would have been obvious to combine Raghavan with Heegard to obtain the invention as specified in claim 5.

As per claims 6 and 14 Raghavan and Heegard disclose claims 1 and 8. Heegard also discloses that trellis representing said MLT-3 code has a plurality of trellis states, each of said trellis states associated with a value for a signal in a previous symbol period and each of said trellis states having at least two branches leaving or entering each state, each of the at least two branches corresponding to state transitions associated with the two binary values (figure 1A column 3 lines 37-50). Raghavan and Heegard teachings are analogous art because they are from the same field of

endeavor. At the time of the invention it would have been obvious to a person of

ordinary skill in the art to integrate the joint equalization and decoding technique

disclosed by Heegard with the MLT-3 code and a dispersive channel scheme disclosed

by Raghavan. The suggestion/motivation for doing so would have been to reduce the

intersymbol interference (ISI) improving the BER of the system (Heegard abstract).

Therefore, it would have been obvious to combine Raghavan with Heegard to obtain the

invention as specified in claims 6 and 14.

As per claims 7 and 15 Raghavan and Heegard disclose claims 1 and 8.

Raghavan also discloses an Ethernet channel (column 1 lines 11-34). Raghavan and

Heegard teachings are analogous art because they are from the same field of

endeavor. At the time of the invention it would have been obvious to a person of

ordinary skill in the art to integrate the joint equalization and decoding technique

disclosed by Heegard with the MLT-3 code and a dispersive channel scheme disclosed

by Raghavan. The suggestion/motivation for doing so would have been to reduce the

intersymbol interference (ISI) improving the BER of the system (Heegard abstract).

Therefore, it would have been obvious to combine Raghavan with Heegard to obtain the

invention as specified in claims 7 and 15.

As per claim 12, Raghavan and Heegard disclose claim 11. Heegard also

discloses that the sequence detector employs a super trellis that concatenates said

trellis representing the encoder code and the trellis representing said dispersive channel

(figure 1, column 1 lines 56 to column 2 line 5; column 6 line 41 to column 7 line 7),

where the sequence detector comprises a branch metric units (BMU) that calculates

branch metrics based on said received signal (figure 5 block 520; column 8 line 36 to

column 9 line 14); an add-compare-select unit (ACSU) that determines the best

surviving paths into said trellis states (figure 5 block 500; column 8 line 36 to column 9

line 14); and a survivor memory unit (SMU) that stores said best surviving paths (figure

5 block 510; column 8 line 36 to column 9 line 14). Raghavan and Heegard teachings

are analogous art because they are from the same field of endeavor. At the time of the

invention it would have been obvious to a person of ordinary skill in the art to integrate

the joint equalization and decoding technique disclosed by Heegard with the MLT-3

code and a dispersive channel scheme disclosed by Raghavan. The

suggestion/motivation for doing so would have been to reduce the intersymbol

interference (ISI) improving the BER of the system (Heegard abstract). Therefore, it

would have been obvious to combine Raghavan with Heegard to obtain the invention as

specified in claim 12.

As per claim 20 Raghavan discloses claim 19. Raghavan doesn't specifically

disclose using a trellis to perform joint equalization and decoding of the encoded signal.

Heegard discloses using a trellis to perform joint equalization and decoding of the

encoded signal (abstract; figures 4 and 5 column 8 line 1 to column 9 line 28).

Raghavan and Heegard teachings are analogous art because they are from the same

field of endeavor. At the time of the invention it would have been obvious to a person of

ordinary skill in the art to integrate the joint equalization and decoding technique

disclosed by Heegard with the MLT-3 code and a dispersive channel scheme disclosed

by Raghavan. The suggestion/motivation for doing so would have been to reduce the

intersymbol interference (ISI) improving the BER of the system (Heegard abstract).

Therefore, it would have been obvious to combine Raghavan with Heegard to obtain the

invention as specified in claim 20. Raghavan and Heegard teachings are analogous art

because they are from the same field of endeavor. At the time of the invention it would

have been obvious to a person of ordinary skill in the art to integrate the joint

equalization and decoding technique disclosed by Heegard with the MLT-3 code and a

dispersive channel scheme disclosed by Raghavan. The suggestion/motivation for

doing so would have been to reduce the intersymbol interference (ISI) improving the

BER of the system (Heegard abstract). Therefore, it would have been obvious to

combine Raghavan with Heegard to obtain the invention as specified in claim 20.

As per claim 21, Raghavan and Heegard disclose claim 16. Heegard also

discloses concatenating the trellis with a trellis representing a channel to obtain a super

trellis (figure 1, column 1 lines 56 to column 2 line 5; column 6 line 41 to column 7 line

7). Raghavan and Heegard teachings are analogous art because they are from the

same field of endeavor. At the time of the invention it would have been obvious to a

person of ordinary skill in the art to integrate the joint equalization and decoding

technique disclosed by Heegard with the MLT-3 code and a dispersive channel scheme

disclosed by Raghavan. The suggestion/motivation for doing so would have been to

reduce the intersymbol interference (ISI) improving the BER of the system (Heegard

abstract). Therefore, it would have been obvious to combine Raghavan with Heegard to

obtain the invention as specified in claim 21.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Raghavan and Heegard as applied to claim 9 above, and further in view of Liao (US

5546430 A). Raghavan and Heegard disclose claim 9. Heegard also discloses that the

reduced complexity sequence estimator further comprises a branch metric units (BMU)

that calculates branch metrics based on said received signal (figure 5 block 520; column

8 line 36 to column 9 line 14); an add-compare-select unit (ACSU) that determines the

best surviving paths into the reduced states (figure 5 block 500; column 8 line 36 to

column 9 line 14); a survivor memory unit (SMU) that stores said best surviving paths

(figure 5 block 510; column 8 line 36 to column 9 line 14); and a decision-feedback unit

(DFU) that takes survivor symbols from said SMU to calculate ISI estimates for the

reduced complexity (figure 5 block 510; column 8 line 36 to column 9 line 14) where the

ISI estimates are used by said BMU to calculate branch metrics for transitions in the

reduced complexity trellis (figure 5 block 520; column 8 line 36 to column 9 line 14).

Raghavan and Heegard don't specifically disclose that the reduced complexity

sequence estimation technique is a reduce number of states. Liao discloses a reduced

complexity sequence estimation technique with a reduce number of states RSSE

(column 2 lines 35-43; figures 7-9; column 5 lines 46-51; column 8 lines 14-63; column

10 lines 55-60). Raghavan, Heegard and Liao teachings are analogous art because

they are from the same field of endeavor. At the time of the invention it would have

been obvious to a person of ordinary skill in the art to integrate the MLT-3 joint

equalization and decoding technique disclosed by Raghavan and Heegard with the

reduced complexity sequence estimation technique disclosed by Liao. The

suggestion/motivation for doing so would have been to reduce the price of the system.

Therefore, it would have been obvious to combine Raghavan and Heegard with Liao to

obtain the invention as specified in claim 10.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Juan A. Torres whose telephone number is (571) 272-

3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Juan Alberto Torres
02-03-2006

KEVIN BURD
PRIMARY EXAMINER